


A SINGER'S PERSPECTIVE ON RECRUITMENT, AUDITIONING, AND
VOCAL TECHNIQUE IN THE CHORAL PROGRAM

Lindsay Patten



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Columbus State University

**A Singer's Perspective on Recruitment, Auditioning, and
Vocal Technique in the Choral Program**

By

Lindsay Patten

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
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Schwob School of Music

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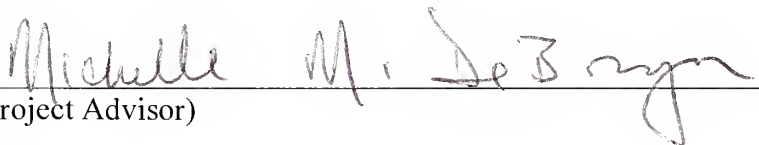
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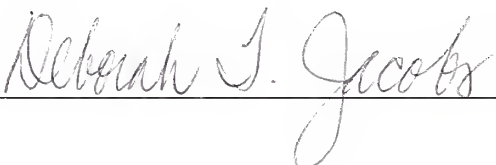
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presented by: Lindsay Patten

a candidate for the degree of Master of Music in Music Education
and hereby certify that in their opinion it is worthy of acceptance.


(Project Advisor)





“Why do we teach music? Not because we expect you to major in music. Not because we expect you to play and sing all your life. Not so you can relax. But... so you will be human. So you will recognize beauty. So you will be more sensitive. So you will have something to cling to. So you will have more love, more compassion, more gentleness, more good, in short, more life. Of what value will it be to make a prosperous living unless you know how to live? That is why we teach.”

-Unknown

Abstract:

Choral singing has been a part of culture for centuries. Choirs are comprised of singers with a near endless variety of experience levels in terms of training and technique. Three problems that face directors of choirs are: 1) How to recruit and retain students for their programs, 2) How to audition and structure, and 3) How to incorporate vocal technique into the choral rehearsal. In this paper I address some suggestions for recruitment that will touch on the ideas of both intrinsic and extrinsic motivations as well as the basics of group vocal technique – breathing, tone, and diction, and reference the teachings of respected choral conductors and pedagogues. I also compare and contrast those findings with the basics of vocal pedagogy for the solo singing student. With the understanding that singing is singing, I expect to find many overlapping fundamentals in technical approaches. For example, breathing for singing is the same regardless of whether the singer is singing alone or in a group. However, I address the possible compromises in solo vocal technique that a choral singer must make. Finally, I address some basic techniques for including the found principles into the high school choral rehearsal, thereby establishing a sound vocal foundation for high school singers.

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Introduction

High School choral directors are faced with a wide variety of responsibilities that vary from teaching the basics of music theory and history to recruitment and retention. Ultimately, the responsibility of the chorus teacher is to nurture his or her students' interest in music and singing and to make sure that a foundation is laid that will serve them in their future singing endeavors, regardless of style. This task can seem quite daunting when thought of in combination with the disciplinary and administrative responsibilities of teachers in general. A few questions come to mind: How do chorus teachers make their program appealing enough to students that they sign up for the non-academic class each semester? How, in the finite amount of class time, do chorus teachers manage to cover the material that needs to be covered in class – music fundamentals, basic music history, vocal technique, and musicality? How does a chorus teacher cater to the needs of those students who are especially interested in singing, and help those students prepare for college auditions, as well as other vocal activities that may or may not be related to the high school choral activities? The following will explore in detail, the preceding questions in hopes of demystifying some of the expectations of a choral teacher.

Recruitment

First and foremost, in order for a chorus teacher even to begin to be effective, he or she must have students in the classroom to teach. High School students today are faced with what seems to be an exponentially growing amount of expectations. Academic pressures increase as each day passes, and colleges constantly broaden what it takes to appear as a well-rounded, exceptional applicant on paper. For these reasons as well as others, students are sometimes drawn toward other elective classes and leave chorus behind. How does a chorus teacher entice students to register for a class for which they often earn no credit? There is no simple answer to this question. There will always be a handful of students who are motivated by the music or by the inherent desire to sing. These students are intrinsically motivated, or motivated by a genuine desire to be a part of the musical experience. These students are also, in general, the minority. The ideal situation would be a balanced choir made up of all students who had a genuine interest in singing for singing's sake. The reality is that many students will be motivated extrinsically to join a chorus class. Choral teachers must accept this as reality and work with these students where they are with hopes of inspiring an appreciation for music along the way. One way to think of intrinsic motivation is as motivation that comes from an inner desire to participate in something. People that are

intrinsically motivated to participate in chorus are those who genuinely enjoy singing or being a part of the special group of people that forms the chorus. These students are not in chorus to experience some kind of personal gain in a tangible sense. They, for example, would be motivated to participate in a choral festival for the singing experience or for the quality time with the group rather than the hope for a trophy.

Many students simply have a need to belong to a group in high school settings, and chorus can provide these students with the group of which they wish to be a part. Barbara Brinson (1996) discusses several ways to extrinsically motivate students to join a choral program. An example of this is something as simple as having a chorus t-shirt. By providing students with a tangible representation of the group to which they belong, the teacher fills that desire of his or her students. Many teachers also use bonding activities as a way to attract or recruit students into the program. One example of an activity like this would be to have an annual choral retreat. Such an event could be held over a weekend during the school year or prior to the beginning of the school year. The timing could be altered to fit the needs of the specific choral program and its participants. During a retreat, the students could participate in ice-breaker activities to get to know each other better, or perhaps they could play a role in the selection of some repertoire for the coming year. Current students would have the responsibility of bringing new, interested people to the retreat. As an incentive, the teacher could provide prizes for the people who bring the most potential participants along. The

possibilities are basically endless; the most important thing is to stay creative and to know the students and what they want. Brinson also says “Nothing succeeds like success” (Brinson 19). Having a successful program is the greatest recruitment tool there is. By producing a quality sound and presenting a unified enjoyable image, the teacher will enable the program to speak for itself.

Another question that comes up with the subject of recruitment is where to find students to recruit in the first place. One of the best ways to recruit is to focus on the feeder schools to the high school. These schools also have choral programs, and many of the students enrolled there will continue with the study of choral music if they are aware that it is possible. Performing at feeder schools is a great way to advertise for the program while also providing the high schoolers with a performance opportunity. To make the performance experience more all-inclusive, choral teachers can plan performances where the groups from the different schools perform for each other. While younger students might be encouraged to continue musical study by hearing the high school chorus sing for them, they will also experience a form of motivation to continue if they are given the chance to perform for the older students and receive encouraging feedback. Creativity is essential when recruitment is the focus.

One thing that chorus teachers may not initially think about is to befriend the athletic coaches at their high schools. Choral directors across the country consistently wish for more male voices in the choir. Stereotypically, male high school students are often interested in sports. Because of this athletic interest,

these possible male chorus members are very in-tune with the thoughts of their coaches. By communicating with the coaches and working with them, chorus teachers will potentially gain access to a wealth of talent in the male populations of their respective schools. If the male teachers at a school are in support of the chorus, the male students will have role models who will support them in their decision to take chorus. Another way to inspire interest amongst the male student population at a given school is to bring in a professional, all male performing group (Appendix A). Again, role models are important. If the only figure of authority that students see associated with the chorus is the chorus teacher, she may not have as much pull with as many of the students. Our job is to provide students with opportunities while in school, and to help them see the potential in what is to come after school. Hearing professional singers is an invaluable tool for students who are studying singing.

Along the same lines as working with the athletic coaches, is the idea of working with the guidance counselors. Chorus teachers may need to help guidance counselors understand what goes on in a chorus class so that they can then better advise students to register for chorus. Many times chorus classes can be treated as somewhat of a “dumping ground” for students who have no academic pressures pushing them to sign up for specific electives. Sometimes this can serve as a blessing, and sometimes it can be a frustrating issue. One of the most often misunderstood concepts about chorus classes is that they are not (if taught well) sing-alongs. There is a curriculum that is followed and that progresses each

semester. It is up to the chorus teacher to assure that the guidance counselors are aware of the structure of the program and the level of expectation that the teachers will have of the students will have as members of each offered class, and also that the students will have of the teacher and the class. Recruitment is an ongoing battle that may continue to be a growing challenge as time goes on. Ultimately, the chorus teacher must be creative in his or her efforts to overcome this challenge.

Auditioning

To audition or not to audition... What is the right approach to a successful choral program? It is my belief that there is no right or wrong answer when it comes to how a teacher chooses to handle admittance into his/her choral program. Auditioning may be restricted by the administration of some schools, and it may be encouraged by the administration of others. It is also my belief however, that every child has the right to participate on some level in musical instruction inside and outside of scholastic structure. Fundamentally, students should understand the process. If there is to be an audition for admittance into the program, students should be aware of the criteria on which they are being judged. Possibly even more important is that students trust that the audition process is based upon a method or evaluation that is not based any type of favoritism. An audition is helpful for determining voice placement within the ensemble, and also for getting an idea of the skill level and level of vocal development of the singers who are/will be part of the choir. Within the structure of a choral program, auditions can serve as a form of selection for special privileges such as solos, select groups, and special performance opportunities (see Appendix B for a sample audition form).

Structure

Once students are in the classroom, it is then the teacher's responsibility to teach a nearly impossible amount of information in a very short amount of time. The best way to cover the most amount of material in the most effective way is to develop a system or a routine and stick to it. Each school is scheduled differently, but once a teacher is familiar with the length of each class and the performance demands versus the academic demands, he or she can better determine how to structure each class session. One possibility, for the most interested students, is to work into the schedule a time where individuals can have miniature voice lessons during the school day. According to Wolverton (1989), school administration will often allow students to use part of a study hall period or even another academic class as their voice lesson time. By providing this one-on-one attention, the vocal progress of individuals in the choir will increase in rate, thereby strengthening the overall skill of the group. Another idea that Wolverton addressed is the idea that these students who participate in private study should come together occasionally as a "studio." This time together should serve as a performance opportunity for these students. The ability to have private lessons during the school day is definitely an ideal situation. If this is not available, or not all students who are interested are able to participate, there are still ways of including these types of

experiences in the structure of the choral program. There are festivals for solos and ensembles in most states. Participants in these events can utilize the “studio” types of experiences in preparation for the event and also as reward for successful performance in the event.

Vocal Technique in the Chorus Classroom

The fundamental concept in a chorus class is how to sing and sing well. In order to accomplish this, the teacher must understand the basics of vocal pedagogy and how these concepts relate to the ideal choral sound that he or she has in mind when rehearsing the given literature. One important multi-encompassing technical idea for both the choral singer as well as the solo singer is the idea of the warm-up. It is here that the singer wakes up the body physically, energizes and activates the support mechanism, and begins to establish a pleasing tone. The warm-up is absolutely essential to a successful rehearsal. It is easy for students to become complacent during warm-ups and resort to an automatic pilot approach. The choral director must insist on consistent, focused, and deliberate attention during each warm-up. It is also a good idea to verbally express the importance of this part of the rehearsal to the students, thereby increasing their understanding of the process and inspiring a deeper commitment. It is also a good idea to introduce students to the basics of vocal pedagogy. A unit on vocal technique and the physical make-up of the vocal mechanism is not only a way to help the students understand what they are trying to do in the rehearsal setting, but also a way to add an academic element to the choral class and also provide a concrete method of evaluation (for

sample unit, see Appendix H). The basic concepts of vocal technique will be addressed in these categories: posture/alignment, vocal “sigh,” breathing and support, resonant phonation, and blend/seating.

I. Posture/Alignment

Singers are unique in the fact that their bodies serve as their instruments. Because of this uniqueness, everything that affects the body, affects the sound that the instrument is able to produce. Singers must acquire an understanding of this phenomenon, and teachers of singing, thus, must make posture or alignment the first of the basic principles of vocal technique. Phonation happens as a result of air, and in order for singers to effectively take in air and manage the exhalation of that air the body must be aligned for these actions to occur. Because of the sheer necessity of correct physical alignment to the success of the choir, choral teachers must be careful when teaching concepts related to *posture*. Often the word ‘posture’ has a connotation of rigidity or stiffness. These connotations, if unaddressed, will result in a tense or harsh sound from the choir. James Jordan goes as far as to say “the initial step [in the choral rehearsal] is to perform activities that will take the posture in a direction of deconstruction—breaking apart the muscular rigidity and postural incorrectness, and moving to a state of body alignment borne out of a balanced and aware skeletal system” (Jordan 10). James McKinney uses the following adjectives when describing good posture/alignment: “buoyant, expansive, erect, alert, free-to-move, vibrant, flexible, poised, tall, loose, free, happy, [and] balanced” (McKinney 35). Posture for singing individually or in

a group is essentially the same. The successful singer will eliminate excess body tension and enable the instrument to work freely.

II. Vocal Sigh

James Jordan advocates the use of the vocal “sigh” in the early stages of the choral rehearsal, as well as throughout the rehearsal. The “sigh” can be very telling of the vocal health of the ensemble. Health, in this case, not only refers to the state of being well, but also the vocal state of the vocal techniques of the individual choir members. To execute a vocal “sigh” the group would begin in a high register (for males in the falsetto voice) and with no tension begin to phonate on an open vowel, such as [a] or one that allows for a spacious sound, such as [u]. The goal of this exercise is to float from the higher range pitches seamlessly through the lower part of the instrument with no tension. By listening to the sighs of the choir, the choral teacher can gain an accurate idea of any problems that may be in the sound initially. The sound that comes from the sigh should be one that is free and easy, and contains no tension. There should not be a grabbing or abrupt onset, but instead a warm enveloping sound that is as easy to produce as the typical sigh associated with normal speech/inflection in everyday activity. The sigh is not the only tool a choral teacher should use, but it is a good indicator of where the choir is. This information will help guide the remainder of the warm-up specifically by allowing the choral teacher to hear where tension is lingering. Once a baseline is established, consistency of sound and freedom from tension can

be reinforced throughout not only the remainder of the warm-up, but also the remainder of the rehearsal in its entirety.

III. Breathing and Support

Breathing for singing and the concept of breath support are probably two of the most difficult concepts for beginning singers to grasp. In general, the natural act of breathing lacks both energy and the presence of mind to serve as breathing for singing. Singers must actively control both the inhalation and the exhalation in order to successfully produce a healthy, pleasing sound. Many times young and eager voice/choral students will fall into one of two categories: 1) those who are too passive in their inhalation and the control of their exhalation or 2) those who try to “make” breath happen and end up inhibiting their sound because of too much effort. David Alt addressed the latter of these groups by saying, “Freedom, not strength, is the key to successful singing” (p. 1). Techniques utilized in breathing for singing should fall in line with the concepts for correct posture: excess tension should be avoided at all cost.

According to James McKinney, “breathing for singing has four stages: (1) a breathing-in period (inhalation), (2) a setting-up-controls period (suspension), (3) a controlled-exhalation period (phonation), and (4) a recovery period” (48). During the “breathing-in period” the singer should concentrate on taking in a silent, low, and deep breath. Over the years, choral directors have come up with ways of helping their singers to discover a proper inhalation naturally. One of the most popular ways to do this is to have the singer(s) lie on the floor with a book (or

other substantial object) on his or her abdomen. The singer should observe the rise and fall of the mid-section of his or her body. This sensation is harder to feel when upright, so by taking out the difficult variable the chorus teacher will potentially speed up the realization process of what a correct inhalation should feel like.

Another aspect of the inhalation that is sometimes confusing for young singers is the need for a feeling of space in the throat. Choral directors often use the yawn analogy when trying to get their singers to breathe with space in the throat. During the act of yawning a singer can in fact feel the sensation of having space in the throat. However, if one attempted to sing leaving the throat and all the musculature in the same position as it is in the height of the yawn, a strange sound would result. Giovanni Battista Lamperti addresses this possibly confusing phenomenon by saying, “Many have misunderstood and tried to do both [yawn and sing] at the same time, hoping thereby to superinduce the feeling of an open throat” (111). Yawning is only a tool used by choral teachers to enable the singers to feel what an open throat feels like. Perhaps if singers are having trouble achieving an open sound, or overcompensating by trying to produce sound with the throat in the same position as it is in for a true yawn, another tactic should be employed. The vocal sigh can be helpful in this area as well. Assuming a singer is accustomed to using the vocal sigh in the context of a rehearsal, and is familiar with what it sounds and feels like when the choral teacher is pleased with the results, the teacher can use that as a landmark to help guide in the vocal discovery which is, in essence, technique. The amount of pharyngeal space needed for the proper

classically balanced sound to result is different for each singer. Because our physical make-up is subtly different, teachers need landmarks like this to help aide them in helping the students discover for themselves what is correct for them. Because breathing correctly is of utmost importance to successful vocal production, the stages of breathing are often broken into categories. In the text to follow, breathing will be addressed in this way using the categories of: Silent inhalation, Suspension, and Resistance.

A. Silent Inhalation:

The importance of the inhalation has already been discussed. However, it is not enough to simply say that the singer must be able to breathe deeply, and take in enough air to support the sound that follows. There are many ways of taking in air, and there are probably just as many misconceptions of how the air actually enters the body. Often teachers pay great attention to impressing upon their singers the importance of “using the diaphragm” and breathing deeply. Vocal pedagogues understand that while the diaphragm is important in the act of breathing, it is an involuntary muscle that cannot be controlled by singers. It is true that a sign of a good inhalation is that the lower abdominal muscles expand when the singer inhales. However, this is only a small part of correct breathing. Another important aspect of taking air into the body is that the inhalation should not be audible. Many times, in an effort to draw more air into the lungs, singers will subconsciously make noise as they bring air into their mouths. The amount of air a person draws into his/her body cannot actually be affected by extra forceful effort, without causing tension that will negatively impact the sound the singer is able to produce. The most efficient way of taking in breath is to allow the body to do what it naturally does. This is to say that the singer should allow the muscles of inhalation (easiest described to young singers as the abdominal muscles) push outward from the body allowing air to enter the body. If done correctly, the

inhalation should produce no excess noise, and should set the singer up successfully for the next step in the breathing process, which is the suspension.

B. Suspension:

The suspension is one of the most abstract concepts in singing, and should be addressed only after a reliable consistent inhalation is established. This idea is also very differently expressed by vocal pedagogues, and can be confusing not only for the students, but also for the chorus and voice teachers. The purpose of this stage of the breathing process “is to prepare the breath support mechanism for phonation which follows” (McKinney 50). This is a critical part of the breathing process, but because it is the only aspect unrelated to natural breathing it is difficult for people to understand and successfully demonstrate. Choral directors have developed similar ways of achieving this concept with their singers. Some choir directors call the suspension a resistance against collapsing in the abdominal area. James McKinney outlines an exercise to encourage successful suspension in young singers. The exercise calls for the singer to take in a breath for a certain length of time, hold the air in, without becoming tense, for the same length of time, and then release the air, again, over the same length of time, paying close attention to the breathing muscles. Suspension is a concept that can be “taught” in a wide variety of verbal and even kinesthetic ways, but until the singer truly feels for herself what it is she is trying to accomplish, teachers may feel as though they are guessing blindly in their efforts to communicate this abstract idea.

C. Resistance:

The biggest hurdle to overcome when attempting to achieve a controlled exhalation is convincing the student to remain expanded and engaged throughout the exhalation. All of these techniques take, above all, time to reinforce in order to become more second nature and natural. The choral director plays a significant role in whether or not a strong foundation of breath technique is established. The best way to accomplish this is to be consistent by practicing breathing exercises everyday, and employing these strategies when singing repertoire. Choral teachers will often concentrate on technical concerns during a warm-up portion of the rehearsal and then abandon those principles when the choir begins to rehearse repertoire. This is confusing for young singers, and detrimental to the development of sound technical habits.

IV. Resonant Phonation

The concept of resonant phonation is less abstract for young singers. Although less abstract, the mastery of correct and consistent resonant phonation is a product of lifelong study. The reason it is somewhat easier for students to begin to grasp this concept is because they are working with actual sound. Most choral teachers will face the challenge of reworking the way in which the majority of their students produce sound. The examples of vocal production that are found on average “top forty” radio stations are not examples of sound vocal techniques. The chorus teacher must help the students discover and begin to trust their head voices and the resonance that results before other refinements of their technique can occur. James Jordan advocates the activation of the resonators during the warm-up directly following the breathing exercises. He believes that if this activation does not occur “singers will begin singing with the resonances they have used in their speaking voices all day. Not only are those resonances used in speaking insufficient for sound ‘fuel’ for the singing process, but there needs to be a transition between speaking and singing resonances” (Jordan 13). He continues by affirming that singers must tap into their head resonances in order for the sound to contain the “vibrancy and color” that choral directors desire (Jordan 14).

Choral teachers often use the term *placement* to refer to the ringing sound of a resonant tone. Students of singing need to strive for a forwardly placed tone.

This concept is sometimes misunderstood amongst choral teachers. Resonance is not always developed in young singers to the point where the majority of the choir is singing in a forwardly placed resonant way. Due to this range of degree of development, the tones that are often produced in a forwardly resonant manner come across to the listener (or to the choral director) as though they “stick out.” Instead of shying away from the sounds that the more vocally advanced students are making, choral teachers should embrace those sounds and encourage the development of vocal technique in all their students. Using vocal exercises on front vowels ([i] or [e]) is one way to achieve this sound in the choir. Students of singing can use vibrations in the structure of their faces as guides for whether or not they are singing with a forward tone. Often this area of the face is referred to as “the mask,” and many teachers will ask singers to place the sound in the mask. Clearly the sound is not actually being produced in a different area of the body from the previous sounds they were making, but this is simply a reminder for students to be aware of the sounds they are producing and where they feel the sensations associated with correct singing as well as incorrect singing. James McKinney describes a good sound in eight ways: “freely produced, pleasant to listen to, loud enough to be heard easily, rich, ringing, and resonant, energy flows smoothly from note to note, consistently produced, vibrant, dynamic, and alive, and flexibly expressive” (McKinney 77).

All choirs can be taught to sing well and to produce desirable sound consistently using correct technique. The most important thing for a chorus

teacher to remember is that consistency is absolutely necessary in order for progress to be heard. Each rehearsal must contain the same elements for attention. There must be a warm-up period during each rehearsal in which attention is first paid to alignment of the body in preparation for the work of the instrument, second to the breathing muscles and support mechanism – it should be awakened and made active, third to the establishment of vibrant head resonance, and ultimately the combination of these three large umbrella type concepts combined with the musical elements such as dynamics, color, language, and expressiveness the sound.

V. Blend/Seating

There are some areas of choral technique and some common aspects of teaching choirs that can be pitfalls for the chorus teacher in terms of supporting a healthy vocal production from each choir member. One of the most troubling is the idea of choral blend. In effort to get a choir to *blend*, the choral teacher often stifles the efforts of some voices while asking too much from the efforts of others. Fundamentally, the goal of choral singing is to create a synergy amongst a group of singers resulting in what sounds as if one voice is actually singing. This goal is not to be taken to a literal extreme, but in the best choral performances there is a unified, hovering sound that results from a blend of the natural characteristics of the choir members' voices.

How does this blend happen? There are several ways to approach this concept in the choral rehearsal. Unfortunately more often than not, the method is to simply talk about *blend* and ask singers to match the sounds of those around them. Each voice is different and has different organic weight and color, among other characteristics. To require a singer to attempt to sound as another singer sounds can breed excess tension. In order to combat this potential downfall, James Jordan (2005) advocates seating the choir so that like voices are around one another. In order to do this he suggests that choir directors ask their singers to sing the first phrase of "My Country 'tis of Thee" at a mezzo forte or forte level making

no attempt to blend with the person next to them. The singers sing in two's, and the choir director places them in order based on the matching of the natural characteristics of each voice. He also suggests avoiding the traditional block seating arrangement based on voice type or part.

“Seating arrangements that have singers placed in “blocks” are dangerous, as singers unknowingly raise their larynx position because of the overabundance of resonance around them. Larger voices tend to develop many vocal tensions in such arrangements because there is not an acoustical freedom that encourages free singing. Smaller voices, likewise, develop tensions because they begin to over-sing to “compete” with the glut of vocal sound around them.

A choral teacher who is aware of this potential problem and can work with the natural characteristics of the voices of his/her singers can better position him/herself to hear legitimate vocal problems that may be present, while eliminating the possibility of vocal problems that are easily solved in non-vocal manners.

Another possible issue related to blend is vowel purity. Striving for pure vowels that are consistently produced across the sections of the choir can create a blended sound while preserving the technique of the individuals. This is an area that is challenging to teachers. Performance dates add pressure to the rehearsal process, and due to these pressures, teachers may unintentionally compromise the individual techniques of their students in order for the whole ensemble to sound

unified. Each vowel resonates best in each voice type at a specific range. The ideal resonating range is a result of vowel formant tuning, and because the ideal pitch range of each vowel is different for each gender, and slightly different between voice categories, this phenomenon presents a challenge in a group warm-up portion of a choral rehearsal. In order to be efficient with time, choral teachers warm up the choir as a whole. In more advanced settings, where the ensemble is made up of individually vocally trained singers, the conductor may ask the singers to warm up prior to the rehearsal and arrive ready to sing. By doing this, the conductor allows the singers to do what they know they need to do for their respective instruments in order to be vocally ready to rehearse the material for that day. However, in most high school situations this would not be possible because of the academic structure of the school day and also because these students are in the beginning stages of their vocal development, and will not yet understand what they need to do to fully warm themselves up. The smart choral teacher will in fact, use time in the most efficient way possible and warm the choir up as a whole. (Some situations may result in schedules that have choral classes split by gender. Teachers in these settings would not have to worry about this area of concern as much.) In doing this, the conductor should be aware of which vowels function best for which voice type and in what ranges, making sure to accommodate and challenge all singers in the ensemble. For example, the easiest vowel for male singers to sing in the middle voice is [a]. Simultaneously, the most difficult vowel for a female singer to sing in the middle voice is [a]. While all sections of the

choir will encounter the [a] vowel within the context of a piece of choral literature, the conductor can help ease the difficulties that the sections will have by incorporating the use of all vowels in the warm-up. In other words, conductors should cover large ground in terms of pitch range as well as vowel selection during the warm-up period because, while it is scientifically true that the production of certain vowels in certain areas of the voice is more difficult, the fact remains that as singers, we are required to sing whatever vowel is in the text on whatever note the composer chose to write. (For more specific information related to formant tuning, see appendices.) The concept of formants is an area of choral/vocal technique that is very much related to resonant phonation.

To continue with the idea of blend as a result of intonation of vowels, vowel purity should be a goal at all times, not just vowel purity for the sake of resonance, but also for the sake of the integrity of the language. Each language has its own unique colors that should be addressed when leading a group of singers in the study of a piece. However, because of the differences in formant tuning amongst voice types, accommodations may need to be made in the vowel production in specific sections of a choir or individual singers. This is to say that a phrase that sits in the middle range and is written to be sung on an [a] vowel will be challenging for a section of sopranos in terms of keeping the voice lined up in resonance and having the vowel speak clearly and register to the listeners as a well-sung [a] vowel. Choral teachers have an obligation to familiarize themselves

with these possibilities and understand where in the repertoire these issues may arise.

VI. Developmental Concerns

The voice is a fascinating and unique instrument that is housed in our bodies. While most people associate a vocal change in adolescents with puberty, voices, as instruments, develop slowly over a great number of years. Choral teachers should choose repertoire with the development of their singers' voices in mind. It is imperative that young singers sing within a range that is comfortable for them. There is repertoire available that is legitimate to the field, but also remains in an area of vocal safety for the young singers. During the period of vocal change in male voices, it is better for choral instructors to utilize pieces that are written or arranged for soprano, alto, and bass. The three-part configuration usually allows the males voices to sing in a middle range that will be most comfortable and accessible for the majority of the male singers. Of course, there will always be exceptions. In these cases, it is of utmost importance that the choral teacher reassures the young male singer who is experiencing vocal challenges. The teacher in these situations has the power to affect dramatically the way the student views music in general. Students should never be pushed to attempt to create sounds that will not happen naturally and without strain. They should also never be made an example of in a negative way. When choosing repertoire, the chorus teacher should pay close attention not only to range, but also to tessitura. If the vocal line sits in an area of vocal challenge for young voices, it may be necessary

for the teacher to wait and work on the piece when the voices of the ensemble members mature.

Of similar concern in a choral situation with young singers is vocal classification. Many teachers are quick to determine the classification of their singers, and can sometimes incorrectly classify some voices. Young voices develop over time, and no amount of pressure can speed this process along. Specifically, heavier high range voices will take time to develop in the extremity of those ranges. Careful attention must be paid to the vocal comfort of the students in the choir, as choral singing requires classification to some extent to have all the parts represented. It may be helpful for choral directors to develop a system of rotation for the assigned parts that members of the ensemble sing. It is a reality that the majority of female singers are sopranos. However, many young singers do not know, yet, how to negotiate their upper range. There are also many developmental hurdles for young singers to conquer. A system that rotates the female singers between soprano and alto would help to build the ranges of those singers who need extra help in that area, and also help ease some of the developmental strain that can come from singing in challenging vocal areas for extended periods of time. For example, a young soprano with a larger instrument might have difficulty navigating through the passaggio of her voice. Many choral arrangements demand that the sopranos sing often in this area of the voice. Some selections are more demanding than others. A rotation system would allow the choral director to decide which voices would negotiate the vocal demands of the

given music best. This system would also allow the singers to have a vocal rest.

The bottom line is that it is in the best interest of the choir and also the singers for the teacher to understand the developmental issues that the singers may encounter.

Conclusion

Students of singing experience enough mystery during their study. The choral director who is well-versed in vocal techniques and choral techniques that support healthy vocal production can really be an asset in the students' musical development. In many ways, the choral teacher will serve as both a choral director and a voice teacher. It is imperative that the teacher works to encourage students to sing in a way "that is comfortable for them to phonate without straining" (Wolverton 2). The choral teacher who can manage to preserve the students' interest in singing, inspire a love for making beautiful music, and avoid tense vocal habits can consider his/her job done well.

Appendices

Appendix A

Suggested Professional Performing Ensembles

❖ Five O'Clock Shadow

- Five O'Clock Shadow, a.k.a. "FOCS" is Caleb, Paul, Oren, Stack, and Dan. An all-vocal rock band from Boston, MA, FOCS began in 1991 as a traditional a cappella group. Since then an eclectic mix of 21 members has comprised multiple generations of the quintet. Over the years FOCS released 4 cassettes (back when people actually bought cassettes) and 5 CDs, and gradually morphed into a rock band. But they still leave the instruments off the stage, because they're a vocal group at the core. FOCS has toured extensively throughout the US and Japan. Numerous TV appearances include VH-1's "///break.through/", ABC Monday Night Football, FOX News, WB's Morning Show, A&E, ESPN, and many more. Five O'Clock Shadow also has a long list of distinguished clients like Panasonic, Clear Channel Entertainment, Mohegan Sun, and The New England Patriots. And through their Vocal Challenge program FOCS has presented workshops and concerts to thousands of music students from coast to coast.
- Five O'Clock Shadow can be contacted for booking at booking@focs.com
- *Information provided by www.focs.com

❖ Ball in the House

- Ball in the House is a tour de force of vocal sound that must be heard and seen to be believed. This five-man, pop/R and B "mouth band" hails from Boston, Massachusetts, where they live and operate out of when not touring on the road. Originally formed as a quartet by founder and current vocal percussionist Jon J., Ball in the House has gone through numerous phases and changes on its way to becoming one of the best-known and most-loved acts in the a cappella community today. Like many bands, Ball in the House started out part-time, meeting a couple times each week to rehearse and then gigging wherever and whenever they could. Early performances were limited to coffee houses and other similar, small venues; but over time their vocal music reached out to and found Boston audiences. People began to embrace the energy and style of the band. Over the course of that next year, Ball in the House expanded by two more singers, bringing the total to five members. That decision resulted in the single most influential and important development in the history of the band. With the group's larger size, a vocal rhythm section materialized when Jon J. put his singing on hold to begin learning a complex series of vocal percussive beatbox sounds, becoming a "human drum machine" that continues to dumbfound audiences today. The true sounds of Ball in the House were beginning to emerge. Then, in 1997, another pillar of Ball in the House' s unique and incredible sound came into the picture. Jon J., who at one time attended the Boston Boys Choir School, ran into an old friend from those younger days and asked him about joining the band.

Dave, fifth grade friend of Jon J. and current tenor, came on board and Ball in the House decided it was time to take their combined talents to the next level and become a professional, full-time band. 1997 and 1998 were highlighted by performances at the Apollo Theater in New York, SUNFEST in West Palm Beach, Florida (opening for Paula Cole), and the winning of the 1998 National Harmony Sweepstakes - New England Region. Sometimes the longer journey is more worth traveling and Ball in the House has certainly traveled far. It has been a bumpy road, at times, for the band. After having stable membership and great success for three years, the tragedy of September 11, 2001 occurred. Shortly thereafter, a few long-time members of BitH made decisions to pursue other interests. Jon J. and Dave remained, still believing in their music and still loving performing together. They intended to rebuild Ball in the House, better than it had ever been before. They succeeded. After exhaustive nationwide auditions, Ball in the House improved exponentially by adding Aaron in early 2002 and then Dan in 2003, shortly thereafter becoming a five-man group. The final piece fell into place when Ryan joined in the spring of 2006. Ball in the House had reinvented itself and transformed into something truly special, onstage and off. From those humble roots - two childhood friends who loved singing and shared a dream to live a life of performance - came what has grown into Ball in the House. five guys. five mouths. And a sound unlike anything you've heard before. Ball in the House is dedicated to bringing their distinctive style of pop/Rhythm and Blues to as many people as they can reach, from Boston to L.A., Singapore to New York, and everywhere in between, opening for and performing with acts such as Cher, 98°, Jessica Simpson, Blondie, Smokey Robinson, The Temptations, and numerous others. They can even be heard on national TV and radio as the voice behind the commercials for Cool Whip dessert topping. A review from the Boston Globe put it very succinctly - "Ball in the House has everything you would expect to find in a successful pop/rock band....the one thing it doesn't have is instruments."

- Ball in the House can be contacted at bith@ballinthehouse.com
Ball in the House
56 Granite Ave.
Boston, MA 02124
- *Information provided by www.ballinthehouse.com

Appendix B

Sample Audition Form/Voice Placement Guide

Audition Information Form

Name: _____ Grade: _____

Parents' Names: _____

Address: _____

Home Phone Number: _____

Cell Phone Number: _____

Emergency Contact Number: _____

Class Schedule:

Do you work? Yes _____ No _____

If so, work schedule:

Briefly describe your choral experience (Include what voice part(s) you sang):

Have you taken private voice lessons? Yes _____ No _____

If yes, for how long? _____ Teacher's Name _____

Have you ever taken lessons on another instrument? Yes _____ No _____

If yes, which instruments and for how long _____

Teacher's Name: _____

THANK YOU FOR AUDITIONING!!!!

Voice Placement Guide

Name: _____ Grade: _____

Range: _____ to _____

Natural tendency of voice: bright _____ warm _____ light _____ heavy _____

Assigned Voice Part: _____

Ratings:

Sight-Singing: 1 2 3 4 5

Tonal Memory: 1 2 3 4 5

Intonation: 1 2 3 4 5

Comments:

Choir Assignment: _____

Appendix C

Posture/Alignment Exercises

Comprehension of the concept of posture is vital to the success of singers. The body must be aligned properly in order for the singer to produce the desired sound. Probably because of the importance of this concept, it is possible for teachers of singing to stress “posture” to the extent that it breeds tension in the bodies of the singers. The word *posture* can sometimes encourage rigidity. The most important thing to understand in respect to posture is that the body should be free of tension and able to move. Choral teachers should call the attentions of their students to specific areas of their bodies during the warm-up. Students should take note of their alignment from the bottom up – beginning with the feet, moving on to the knees, hips, pelvis, torso, shoulders, neck, and head. They should understand that the goal is a feeling of freedom. The body should feel tall, relaxed yet energized, and ready to move at all times. Attention to alignment in this way will allow singers to set themselves up for a successful rehearsal or practice session.

Posture Do's and Dont's

Do	Don't
<ul style="list-style-type: none"> ◆ Be relaxed and natural ◆ Keep your movements fluid ◆ Keep your chin level ◆ Keep your knees loose ◆ Keep your head up* ◆ Keep your shoulders sloping and relaxed ◆ Keep your toes pointed forward with your weight on heels and soles ◆ Keep the front of your neck loose - don't stretch it ◆ Keep abdominal muscles relaxed ◆ Keep your back muscles relaxed ◆ Smile! 	<ul style="list-style-type: none"> ◆ Drop or hunch your shoulders ◆ Move stiffly or jerkily ◆ Drop or tuck in your chin when trying to sing low notes ◆ Stretch your head upward when trying to sing high notes ◆ Strain or push your abdominal muscles

*This is not to say that the head should be able to balance a book. The crown of the head should be the highest point. Simply raising the head may cause the chin to stick out, which causes tension. It is good to think of the head as an extension of the spine.

Sample Exercises:

General Stretches

Procedure: The first thing to work on when addressing posture is the release of any previously acquired tension. The students should move their bodies around, loosening up the muscles that will be used in singing. Stretching is important, and should be done every day. Students can also roll their shoulders, their necks, and shift their weight from side to side.

Purpose: Basically this portion of the exercise line-up is to draw attention to tension that exists, help alleviate that, and prepare the body for the activity that is to come.

Raising the Sternum – Quick Check

Procedure: Students should raise their arms as high as they can above their heads. Teachers may want to encourage them to reach toward the ceiling and stand on their tip-toes so that the students are really feeling a stretch. Teachers should ask the students to notice the position of their torsos. Then the students should lower their arms to their sides, making sure not to change the position of the ribs or sternum. The students should feel a difference in their relaxed everyday posture, and the more erect posture that results from this exercise.

Purpose: To make sure the rib cage is open for access to optimal lung capacity

Buoyancy of Posture – Quick Check

Procedure: Have the students imagine that there is a string attached to their sternums, the tops of their heads, and the middle of their upper backs. These three imaginary strings are pulling up towards the ceiling,

Purpose: To encourage a taller, freer posture from the students.

“Sitting Posture”

Procedure: Sometimes imagery works well when attempting to communicate importance of certain concepts in a classroom setting. Have the students imagine a very fragile, old, intricate, expensive china plate. It may help to elaborate on the description for them as they close their eyes and really begin to visualize the china plate. After they have a clear image of the plate, they should imagine that they are holding the plate against their abdomen using only their thumb at the upper abdomen and their first finger at the lower abdomen. Then, give them the task of sitting down without breaking the imaginary plate.

Purpose: This will force them to sit gracefully, maintaining the erect alignment of the torso that they have worked to achieve.

Appendix D

Breathing Exercises

Lip Trills:**Procedure:**

- 1) This exercise is easy to do, and is also easy to evaluate for both the student and the teacher.
- 2) This buzzing action on pitch is only possible when there is consistent airflow that is feeding the sound, and when facial muscles are loose. A lack of “buzz” would indicate lack of air or presence of tension.
- 3) Once the student relaxes that support and allows himself to come off the air, the buzzing sound will stop.

Purpose: To connect breath to tone

Breathing Exercise #1:

Procedure: Have students breathe in for an even count of eight beats then release the breath in a controlled, managed way for an even count of eight beats. The

release of air should be done on the sound of the letter [s.] This exercise should be increased in duration by two counts each time it is performed.

Purpose: This exercise helps students to manage the inhalation and exhalation. They must budget the amount of air they take and how fast. They must also control the exhalation so that all the breath is used by the conclusion of the last indicated beat.

Breathing Exercise #2 – Advanced

Procedure: Have students inhale for a set number of counts. The students will then hold the air in (for the same number of counts) while moving their neck and head around, so as to avoid creating tension. The students will finally control the exhalation, for the set number of counts, on an unvoiced consonant, such as [s.] This exercise encourages increased lung capacity, and trains the muscles associated with the breathing and support mechanism.

Purpose: building lung capacity

Rhythmic Consonants:

Procedure: Teachers can also ask their students to repeat a pattern of consonants.

The combination of consonant sounds, rhythmic values, voiced and unvoiced quality causes the students to focus their energies and attentions to what is being asked of them and also activates the support muscles. Popular consonants used in this way are [p], [b], [t], [k], [s], etc.

Purpose: Activation of the muscles of the mid-section and the increase of the level of focus in the ensemble.

Appendix E
Resonance Exercises

Lip Trills:

Purpose: Just as in breathing exercises, lip trills are helpful in exercises related to resonance. While the connection to the breath is being established, the singer will also experience vibrations associated with resonance as a result of the lip trill exercise. These vibrations can be useful when it is time to transfer the resonance that is achieved in the lip trill to regular vowels.

Humming:

Purpose: If done correctly, humming is another easy way for students to experience what resonance feels like. In order to establish groundwork for resonance building exercises, the hum must be placed as forwardly as possible. It is helpful to ask students to place the sound directly behind their front teeth. Students have a tendency to let the hum fall back in the throat or place it in some other area of resonance that is not as forward. Teachers need to ensure that it is being done correctly if it is to benefit the vocal technique of the choir.

Hum to Vowel:

Procedure: Once the lip trills and humming exercises have helped the students feel resonance, a transition to resonance with vowels must be made. This transition can be done very smoothly by beginning an exercise on a hum and gradually opening to a vowel. For example, the students could begin humming and gradually open to an [u] vowel.

Purpose: The importance of this exercise would be to help the students feel the resonance in the same way during both parts of the exercise. This exercise can be done on any of the vowels, and should be done on a variety of vowels to ensure that the students understand thoroughly what the goal is.

Caution:

One important thing to mention in terms of resonance is that not all vowels resonate the same way in different voices. The [i] vowel seems to be very effective when working with female voices. However, the [i] vowel is much more difficult for male voices to use when trying to connect with their resonance. An [a] vowel might work better when working with male singers on resonance. This discrepancy has to do with formants and formant tuning relative to fundamental

pitch. The best way to compensate for this inevitable challenge is to vary the vowels that are used during the rehearsal. Not only does this challenge the singers to discover correct resonance in a variety of vowels, but it also gives fair opportunity to each voice type for easy resonance throughout the rehearsal.

Glissando:

Procedure: Octave slides are a good exercise for resonance also. The students should begin on the low 'do' of a scale and slide up to the high 'do' of the scale. The goal in this exercise would be for the students to maintain the same focus and resonance in the tone from bottom to top. It is important to stress to the students that this exercise is not to see how pretty they can make their voices sound. This exercise almost works better when the students concentrate very little on how the voice sounds, and only concern themselves with the feeling of resonance from bottom to top.

Purpose: The unification of registers and the establishment of consistent resonance throughout the vocal range.

Appendix F

Exercises Promoting Choral Blend

Unrestricted Singing:

Purpose: One of the most effective ways to encourage true choral blend is by encouraging sound vocal technique from all the singers in an ensemble. Singers that utilize proper technique and understand, on a basic level, how the voice works contribute more to the ensemble's technique. Blend is a result of a combination of factors, and is more readily achieved when the ensemble members are approaching the task with the foundations of a solid technique, rather than attempting to mask inadequacies in the sound.

Vowel Purity:

Procedure: As is necessary in vocalizes or literature, the unification of vowels is essential to choral singing. One way to do this is to speak the vowel first. The teacher should make sure that the students are very aware of the tongue position and the degree of roundness in the lips. Once the ensemble has an understanding of how each vowel is formed, and what it feels like to speak the vowels correctly, transfer these sensations to sung sound.

Purpose: An ensemble that strives for purity of vowel, is able to blend better simply because the members of the ensemble are singing the same thing. This is sometimes difficult to accomplish because of regional accents and unfamiliarity with the languages of singing. However, no matter how challenging this is, the effort is worth it.

Listening Exercises:

Procedure: One exercise to help with blend, outside of strictly vocal exercises, is to have the members of the choir close their eyes while all singing the same vowel. Their task should be to sing soft enough so that they can hear the sounds around them more than they can hear themselves.

Purpose: The exercise of closing the eyes draws the singers' attentions to what they are hearing. It is a great way to train students to listen across the room for blend.

Appendix G

Information about Formants

*The following is a chart of the ideal resonating ranges for each of the pure vowels according to the scientific rules of formant tuning. Vowels are easiest to “tune” when the first formant coincides with the fundamental frequency. For each vowel, both formant 1 and formant 2 are listed for male and female singers. The chart illustrates the difficulty that may arise on the subject of vowel tuning in ensembles containing mixed voices. There are vowels that resonate in similar pitch ranges in both genders. Perhaps, those vowels could be used as benchmarks for the choir.

Vowel	Males		Females	
	Formant 1	Formant 2	Formant 1	Formant 2
[i]	270 Hz C4-sharp	2,290 Hz C7-sharp	310 Hz D4-sharp	2,790 Hz F7
[e]	530 Hz C5	1,840 Hz A6-sharp	610 Hz D5-sharp	2,330 Hz D7
[a]	730 Hz F5-sharp	1,090 Hz C6	850 Hz G5-sharp	1,200 Hz D6
[o]	570 Hz D5	840 Hz G5-sharp	590 Hz D5	920 Hz A5-sharp
[u]	300 Hz D4	870 Hz A5	370 Hz F4-sharp	950 Hz A5-sharp

(McCoy 44-45)

Appendix H

Sample Unit of Study on the Vocal Mechanism

Vocal Mechanism....

How does it all work????

Unit of Study
2 weeks



Unit Plan

Vocal Mechanism... How does it all work???

Outline:

<p style="text-align: center;">Thursday, Ongoing throughout the class.</p>	<p style="text-align: center;"><u>Pre-test – taken on computer with power point:</u></p> <p>The students will be called one by one to take the test on the laptop computer. The pre-test is designed this way so as to cause as little disruption to the Pre-Festival rehearsal that is going on simultaneously. It is also designed this way to fulfill an INTECH requirement. The students will have typed instructions to guide them through the use of the software. They will also have instructions included in the slides of the actual power point presentation. They will record their answers on a provided answer sheet.</p>
<p style="text-align: center;">Monday, 30 minutes</p>	<p style="text-align: center;"><u>Vocabulary Day #1</u></p> <p>The students will define the first 10 vocabulary words associated with this unit. There will be a discussion before the definitions are given. The students will talk about what they think the word might mean. After all thoughts are presented, the class definition will be given, and the students will copy that definition into their notes. The words discussed in this lesson are as follows:</p> <p>1) Inhale 2) Exhale 3) Thorax 4) Diaphragm 5) Trachea 6) Lungs 7) Esophagus 8) Pharynx 9) Larynx 10) Vocal Folds</p>
<p style="text-align: center;">Tuesday, 20 minutes</p>	<p style="text-align: center;"><u>Review Vocabulary at beginning of class</u></p> <p>The students will participate in a vocabulary drill of sorts. The idea is to reinforce each day in preparation for the post-test. They will be asked to recall the definitions learned the previous day in random order. The teacher will also throw in the words that are to come tomorrow just to get them in their ears, and keep them on their toes.</p>
<p style="text-align: center;">Wednesday, 30 minutes</p>	<p style="text-align: center;"><u>Vocabulary Day #2</u></p> <p>The students will define the last 6 vocabulary words. The same type of discussion will be conducted in which the students will talk about what they already know before hearing the exact definition. At the conclusion of this part of the class, the students will have a complete vocabulary list to study in preparation for the post-test.</p> <p>11) Phonation 12) Glottis 13) Voiced and Unvoiced Consonants 14) Register 15) Resonance 16) Intonation</p>

Thursday, 20 minutes	<p><u>Review Vocabulary at beginning of class</u></p> <p>The first 20 minutes of class will be spent going over the definitions for the vocabulary words. The students will be asked to have their notes out but have them upside down until they need to write something down to help them remember.</p>
Friday, 30 minutes	<p><u>Picture handouts & Use of Vocabulary in rehearsal</u></p> <p>A two-page handout will be provided that has pictures of the vocal anatomy. These will help to make the vocabulary seem more 'real.' While we look at the pictures, we will review the vocabulary as it relates to the pictures.</p>
Monday, 30 minutes	<p><u>Review Day #1 & Day #2 Vocabulary together</u></p> <p>This review will be similar to the review from the first day of vocabulary. The students will be asked to define words in random order. This time each student will be given a question personally. The teacher will go down the line and randomly draw from a basket the word that he/she will be asked to define. At the conclusion of the vocabulary review, we will discuss the concepts that are on the test that are not specifically related to the vocabulary words. (For example: size of vocal cords, how the speed of vibration affects pitch, etc. Also use the "100 Years" song for explaining register.)</p>
Tuesday, 30 minutes	<p><u>Study Guides</u></p> <p>The students will be given the questions that will be on the test (the same questions from the pre-test) in a fill in the blank form. We will use the first 30 minutes of class to take this study guide test, and then go over the answers and clear up any remaining confusion. The purpose of this exercise is for them to see where they need work, and also for them to stretch themselves to remember the answers without defaulting to what might make the most sense.</p>
Wednesday, 45 minutes	<p><u>Flash Card Review Game</u></p> <p>The students will be in two teams. All the vocabulary will be reviewed as well as the questions that will be on the test that do not specifically address the vocabulary words. We will go through the questions in random order multiple times (lasting 45 minutes in all) in order to allow for more possible points.</p>
	<p><u>The Changing Voice Video & Final Review</u></p> <p>Today the students will do the final review for the test.</p>

Thursday, 45 minutes	They will also watch the portion of <i>The Changing Voice</i> video. The teacher will ask them to identify key parts of the vocal anatomy that are shown on the video in an effort to provide further visual support for the vocabulary. The final review will be a faster and miniature version of the flash card game that was played the day before.
Friday, 30 minutes (if needed)	<p style="text-align: center;"><u>Post-Test</u></p> <p>The students will take the <u>post-test</u> at the beginning of class. The questions are exactly the same as the pre-test, but the answers have been switched around. (For example, if the correct answer to #1 on the pre-test was <i>a</i>, the correct answer to #1 on the post-test will not be <i>a</i>.)</p>

Appendix I

Possible Seating Arrangements

B1	S1	T1	A1	B5	S5	T5	A5
B2	S2	T2	A2	B6	S6	T6	A6
B3	S3	T3	A3	B7	S7	T7	A7
B4	S4	T4	A4	B8	S8	T8	A8

(Jordan 123)

B1	B1	B1	B1	B1	B1	B2	B2	B2	B2	B2	B2
T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T2
S1	S1	S1	S1	S1	S1	S2	S2	S2	S2	S2	S2
A1	A1	A1	A1	A1	A1	A2	A2	A2	A2	A2	A2

(Jordan 125)

	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	
	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	
A1	A1	A1	A1	A1	A1	A2	A2	A2	A2	A2	A2

(Jordan 125)

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